Bail-In Rules and the Pricing of Italian Bank Bonds*

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Abstract

We analyze whether the introduction of the bail-in tool in January 2016 affected the pricing of Italian bank bonds. Using a unique dataset of 1,798 fixed-rate bonds issued during the period 2013–2016, we find an increase of the spread at issuance of bail-inable bonds compared to non-bail-inable bonds. This increase also depends on the intrinsic characteristics of each bank. Large institutions, banks with lower ratings, profitability, capitalization, and higher liquidity faced a higher cost of issuing bail-inable bonds. Overall, our results seem to support the hypothesis of an improved market discipline for the bank bonds primary market.

Keywords: bail-in, bank bonds, cost of funding, too-big-to-fail.

JEL Classification: G12, G2, G21, G28.

1. Introduction

Since the onset of the Global Financial Crisis a decade ago, many European Governments were forced to intervene through capital injections and purchase of toxic assets in order to support their troubled banks (Ammann et al., 2017) and, consequently, avoid financial contagion within closely interconnected banking systems (Deutsche Bank, 2014). Bank resolutions were costly, indeed, during the 2008-2012 period, with public interventions amounting to roughly 600 billion euros (excluding guarantee schemes), that is 4.6% of the European GDP in 2012 (Benczur et al., 2017). More importantly, because taxpayers' money was used to manage the crisis of (mostly private) banks, public bailouts resulted unsustainable from both a financial and a political perspective.

In addition, the expectation of assistance via publicly funded bailouts amplifies moral hazard behavior, leading to excessive risk-taking in particular for large institutions (Hüser et al., 2017; Pais and Stork, 2013; Zhao, 2018). Large banks benefit of an implicit public guarantee, as they are supposed to be more likely bailed out than smaller institutions (i.e., they are "too-big-to-fail"). This ultimately represents an important market distortion as it allows large banks to raise funding at cheaper rates (Ueda and Weder Di Mauro, 2013).

As recognized even by some supervisors, excessive risk-taking behavior by banks was, among other reasons, the result of the lack of an effective resolution mechanism.[1] Therefore, motivated by the need to reduce the costs of bank resolutions, especially those borne by taxpayers, and in order to improve market discipline, the Parliament and the Council of the European Union approved in 2014 the Bank Recovery and Resolution Directive (BRRD). Effective since January 2016, the new regulatory framework for recovery and resolution of banks gives supervisors a set of instruments to intervene at early stage to prevent situations of bank distress, thus to ensure the business continuity and to reduce the impact on the functioning of the financial system. Nevertheless, the Directive requires that, in case of irreversible disruption of a bank, in order to restore its viability equity holders should bear losses first and subsequently unsecured creditors in a predefined hierarchy, while leaving its secured liabilities intact. This could potentially lead unsecured debtholders see their investment

[1] According to Benoît Cœuré, Member of the Executive Board of the ECB: "*Excessive risk-taking by banks is at the origin of the financial crisis. One of the many factors contributing to their risk-taking behaviour was the distorted incentive structure resulting from the lack of an effective resolution mechanism*" (Cœuré, 2013, emphasis added).

written off or converted into equity (for more details see, among others, Chennells and Wingfield, 2015).[2]

The introduction of the BRRD Directive not only can affect banks risk-taking propensity and stability, but it can also have an impact on the bank funding costs because the bail-in rules transfer risk from taxpayers to unsecured bondholders.[3] Because of this increased risk, holders of bail-inable liabilities may be expected to ask, *ceteris paribus*, for higher returns compared to holders of liabilities that are excluded from the bail-in mechanism. Market discipline (Flannery and Sorescu, 1996, Bliss and Flannery, 2002) would predict that the cost of funding for such liabilities would reflect more accurately their actual risks. However, whether investors will ask for a higher risk premium on bank bonds at origination is ultimately an empirical question, which depends on whether they consider the implementation of the BRRD a plausible threat for their savings.

We believe that Italy is an interesting laboratory for testing the effect of the new bail-in rules on bank funding costs for several reasons. First, Italian banks are quite dependent on bonds as a form of funding compared to banks in other European countries (Coletta and Santioni, 2016). In addition, the portion of bank bonds in Italian retail investor's portfolios is rather greater than the average of developed countries (Coletta and Santioni, 2016; Grasso et al., 2010).

Second, Italian banks place most of their bonds (around 80%) directly to their customers over the counter (Gentile and Siciliano, 2009; Coletta and Santioni, 2016), thus avoiding the costs associated to the listing of these securities and, more importantly, this gives rise to an obvious conflict of interest. As a consequence, unsophisticated retail investors are the main holders of the banks debt securities (Grasso et al., 2010). Italian banks have benefited from their placing power, which allowed them to raise funding via bonds issuances quite cheaply. In fact, Del Giudice (2017) finds that bank bonds were issued at a negative spread (compared to risk free securities) prior to the entry into force of the MiFID I regulation. Interestingly, the same author observes that bank bond spreads turn positive as the MiFID I increases the competitions among banks and trading venues.

[2] In this paper we refer to unsecured liabilities – the target of a potential bail-in enforcement – as the bail-inable debt. In contrast, secured liabilities represent the non-bail-inable debt (see, for instance, Philippon and Salord, 2017).

[3] Please note that, although the "bail-in" is only one of the four resolution tools introduced with the BRRD, in this paper we will often refer to the "bail-in regime" in a broader sense (i.e., not strictly meaning the resolution tool) just to emphasise the change from the previous bail-out framework.

Third, the National Resolution Authority (i.e., the Bank of Italy) applied a *quasi bail-in* to 4 small banks (Banca delle Marche, Banca Popolare dell'Etruria e del Lazio, Cassa di Risparmio della Provincia di Chieti, and Cassa di Risparmio di Ferrara) in November 2015, a few weeks before the official implementation of the bail-in resolution tool.[4] Notably, although those 4 regionally chartered banks accounted for less than 2% of the Italian banking market, the news of their *quasi bail-in* became the hot topic in the news for a while, which could have enhanced investors' awareness about the negative consequences of bail-ins on their savings and investments. In addition, a vast information campaign was properly carried out by the banks in Italy. Indeed, the Italian stock market regulator (CONSOB) late in November 2015 required all the intermediaries to appropriately inform investors about the consequences of the implementation of the BRRD.[5] A survey conducted by the Italian Bankers' Association (Associazione Bancaria Italiana, ABI) in January 2016 also reveals that several initiatives were adopted to massively inform customers about the switch to the new bail-in regime via, for instance, specific leaflet enclosed to the monthly/quarterly bank's statements, as well as through fliers handed out at the banks' branches.[6]

Furthermore, although Italian investors are often blamed of lacking adequate financial literacy (see, among others, Bartirolo, 2011), a study by Accornero and Moscatelli (2018) reveals that at least recently the information regarding the banks' fundamentals, such as the Tier 1 capital ratio, influences Italian households' decisions. Similarly, Boccuzzi and De Lisa (2017) document that market discipline was properly working in Italy around the time the BRRD became effective. Overall, this leads us reasonably think that Italian investors improved their awareness about the potential negative effects arising from funding unhealthy banks.

Interestingly, the BRRD introduction might hit the banks with a different intensity depending on their intrinsic characteristics. Indeed, for those banks that in the pre-BRRD era would have benefited the most from an implicit guarantee, we should observe a greater impact of the new bail-in rules. Notably, bank specific characteristics should influence their bond funding costs with different

[4] Precisely, on November 16th 2015 the Italian Government published the Law 180/2015 that aimed to apply a *burden sharing* approach to four small regionally chartered banks.
[5] The Communication No. 00904030 is available at the following link: http://www.consob.it/documents/46180/46181/c0090430.pdf/09b990c7-1e84-486c-bc24-9875e68e63cd
[6] See in this regard: https://www.abi.it/Pagine/news/Iniziative-informative-in-tema-di-bail-in.aspx

intensity in the *pre-* and *post-* bail-in phases. To the extent that the bail-in tools is valued as a credible mechanism by the market, riskier institutions will be the ones who will experience a higher cost of funding after the introduction of the new rules, as well as large banks that should no longer benefit from any implicit public guarantee.

At present, the existing literature mainly focuses on the effect of the new regulatory framework on bank specific risk and financial stability. For example, using an event-study methodology, Schäfer et al. (2016) analyze the reactions of CDS spreads and share prices related to European banks after the announcement of some operations in which investors suffered a total or partial bail-in. The authors find evidence of a significant increase in CDS spreads and a reduction of share prices. More pronounced reactions take place in those countries where the weaknesses of public finances make it more difficult for them to implement the bailout of a large bank. Moreover, the authors emphasize that it is the actual occurrence of a bail-in, rather than the simple introduction of a new legislation, that produces a concrete reaction. In a similar fashion, Mikosek (2016) investigates the CDS spreads of 20 banks from six European countries, and compares them to the CDS spreads of the corresponding domestic Governments. Starting from 2015, the ratio of the average bank CDS spreads over sovereign CDS increases substantially, showing a sharp misalignment between sovereign and bank risk perceptions. This phenomenon demonstrates that the players of this specific market (CDS market) start at one point to discount the fact that Governments will not rescue banks anymore. As regards the secondary bond market, a recent study from Giuliana (2018) using a difference-in-difference approach finds that bail-in events amplified the difference in daily yield between bail-inable (non-secured) and non-bail-inable (secured) bonds. These findings support the notion that the authorities' efforts to introduce the bail-in regime increased the bail-in expectations in the secondary market. Moreover, Giuliana (2018) provides evidence that the bail-in events reinforced the relationship between a bank's default probability and the price of its securities.

Similar to Giuliana (2018), we investigate the effectiveness of the new banking regulation by comparing the pricing reaction of unsecured and secured bonds. Indeed, as pointed out by Chan-Lau and Oura (2016), the bail-in increases the cost difference between bail-inable and non-bail-inable bonds.

However, a distinct feature of our paper is that we focus on the Italian bond primary market. Notably, we contribute to the literature by measuring the impact of the BRRD introduction on the bank cost of issuing bonds. Indeed, the majority (80%) of bonds issued by Italian banks are not publicly listed. Hence, by focusing on the secondary market we would be disregarding a substantial share of the market. Additionally, we would not be able to offer evidence of the actual cost of funding borne by the banks which, instead, is observable from the primary market (inter alia, Sironi, 2003; Zaghini, 2014; Chan-Lau and Oura, 2016). To this extent, our research work aims to provide further evidence on the credibility of the bail-in mechanism, which adds to current findings from the secondary market.

Our paper is also related to the empirical literature analyzing market discipline as a regulatory tool (see, among others, Calomiris and Kahn, 1991; Calomiris, 1999; Flannery, 2001; Bliss and Flannery, 2002; Hellwig, 2005). As Bliss and Flannery (2002) highlight, market discipline consists of two distinct components: *i*) monitoring, which refers to how market prices reflect the financial condition of a single bank, and *ii*) influence which, instead, describes how such market information affects the incentives for managers to engage in risk-taking behavior. Because we analyze whether the riskiness of banks has an impact on their cost of issuing bonds *pre*- and *post*-BRRD, our work relates to the first category in this classification. Some studies in this field of the literature show that bondholders are quite sensitive to bank specific risks (Flannery and Sorescu, 1996; Jagtiani et al., 1999; Covitz et al., 2000; DeYoung et al., 2001; Hancock and Kwast, 2001). With respect to the European market, Sironi (2003) analyzes the primary market spread of a sample of subordinate bonds issued by European banks in the period 1991-2000. The results of this study show that investors properly price the specific risk factors of each issuer, and that in the second half of '90s the TBTF effect tends to disappear. More recently, Balasubramnian and Cyree (2011) pointed out that, in the USA, the hypothesis to reintroduce a government guarantee for large banks, after the default of the "LTCM" hedge fund, reduced the sensitivity of the spread to bank specific characteristics. Similar conclusions were reached by Santos (2014) who shows the existence of a TBTF effect both in the banking as well as in the non-financial sectors, as large non-financial corporations also enjoyed the advantages due to their size. Yet, the TBTF effect is quite stronger for large banks, suggesting that investors believe that the probability of a

bailout for these intermediaries in time of crisis is very high. A more recent analysis by Acharya et al. (2016) indicates the presence of a TBTF effect in showing that the bond spreads of small and medium banks are more risk-specific related, while this characteristic tends to disappear for bonds issued by large banks.

Using a sample of 1,798 fixed-rate senior bonds issued by 28 Italian banks from January 2013 to December 2016, we first document an increase of bond funding cost in 2016 upon the adoption of the BRRD. Precisely, the average spread (i.e., difference between the yield to maturity at issuance offered by the bank bonds and the yield offered by government bonds with corresponding maturities) followed an interesting path during the observed period, going from 0.56% in the *pre* bail-in period (2013-2015) to 0.70% for bonds issued after 2016. Notably, the difference between the average spreads in the two sub-periods appears to be statistically significant.

Our regression analysis confirms that, even when we account for bond and bank characteristics as well as bank fixed effects and bank-time fixed effects, banks faced a higher cost when issuing bail-inable bonds compared to bonds not subject to the new regulation.

Consistent with the existing literature, we find that banks characterized by lower ratings, profitability, capitalization, and higher liquidity were forced to pay higher spreads to place their bonds with the new bail-in regime. In addition, we observe that large banks (and especially the largest ones) were able to pay a lower spread until 2015. In contrast, after 2015 they face, *ceteris paribus*, an increase in the cost of funding. Eventually, the implementation of the new Directive might have mitigated the too-big-too-fail effect, which is consistent with the findings of, among others, Zaghini (2014).

Moreover, following Schäfer et al. (2016), we show that the implementation of the *quasi bail-in* just some weeks before the effective entry into force of the BRRD contributed to lead retail investors demanding a higher premium for their investment in bank bonds.

We confirm the robustness of our results by conducting several additional analyses. To mitigate the concern that the rise in the spread in the primary market is a consequence of a generalized increase of banks' risk, rather than a result of the BRRD approval, we carry out the following robustness tests. First, following Schäfer et al. (2016) and Giuliana (2018), we show that the spread between bail-inable

and non-bail-inable bonds reacts also to events that do not produce a significant increase in banks' risk, such as when the EU Legislative Bodies voted the resolution to adopt uniform rules for the resolution of banks in April 2014. Second, we exclude from our analysis those banks that, during the observed period, faced serious undercapitalization problems or were subject to any public interventions, and we show that our main findings are not driven by their inclusion in our sample.

Additionally, because the non-bail-inable bonds were issued by a limited number of intermediaries, we run our regressions on a sub-sample of banks that excludes those that did not issue any non-bail-inable bond, and demonstrate that our results remain consistent. Furthermore, because two banks issued almost one third of the bonds in our sample, we run again our models on a sub-sample that excludes them in order to rule out the possibility that the observed increase in the spread is driven by those banks' intrinsic characteristics rather than be representing an overall consequence of the BRRD implementation. Results from this sub-sample corroborate again our hypothesis about the existence of a regulation effect. Finally, we show the robustness of our findings even when we employ different proxies of the bank characteristics.

Overall, our analysis offers interesting policy implications because, as prescribed by the new legislation, Authorities should also count on market discipline to improve their prudential supervision. Higher risk sensitivity, indeed, is especially needed in countries like Italy where, historically, market discipline has not been working properly.

The remainder of the article proceeds as follows. The next Section summarizes the relevant features of the new regulatory framework. Section 3 describes our data and provides a discussion of key summary statistics, and the empirical research methods we employ in this study. Results are presented in Section 4, while additional analyses are offered in Section 5. Finally, Section 6 concludes.

2. Regulatory framework

Motivated by the need of designing a common toolkit for banks resolutions across the globe, as well as addressing the too-big-to-fail issue – thus to prevent new bailouts at taxpayers' expenses – the Financial Stability Board (FSB) set a framework of rules aimed at ensuring ordered resolutions of banks and limiting the use of state coffers. These principles were transposed in the European

Legislation via the adoption, in May 2014, of the so-called BRRD. The most known resolution tool introduced by the European Directive is the "bail-in" (as opposed to bailout), which was made available at each EU member states Resolution Authority since January 2016.[7] In essence, under given circumstances, the National Resolution Authority (or the Single Resolution Board, under its power over the national Bodies) is allowed to impose the losses of a failing bank to its owners and creditors, according to a pre-defined hierarchy. Specifically, loss absorption via "bail-in" is achieved by first writing down Common equity TIER 1, then Additional TIER 1 capital, TIER 2 capital, all other Subordinated Liabilities, all other Senior Unsecured Liabilities, and finally eligible deposits over 100,000 Euro. Notably, the bail-in tool may be applied to recapitalize an institution, as well as to convert to equity or reduce the principal amount of claims that are transferred either to a "bridge institution", or under the "sale of business" or "asset separation" tools (BRRD, Art. 43). This should enable a fairer resolution process of the banks, by excluding (or at least limiting) the injection of taxpayers' money. Furthermore, some liabilities are explicitly excluded from the bail-in scope, such as covered deposits, secured bonds, liabilities to other financial institutions with an original maturity of less than seven days, employee remuneration, liabilities to commercial or trade creditors relating to the provision of critical goods or services, liabilities to tax and social security authorities that are preferred by law, liabilities for contributions to deposit guarantee schemes.[8] These exclusions would, *de facto*, make the excluded claims senior to bail-inable debt.

Overall, by designing the bail-in tool, the policy maker aimed at increasing the incentive, for creditors, to monitor the health of banks during normal times, thus limiting the occurrence of new bank failures.[9]

3. Data and Empirical Methodology

To select our sample of bonds, we start out with all the banks in the Thomson Reuters Eikon database that issued fixed-rate bonds from January 2013 to December 2016. We further rely on the following

[7] Apart from the bail-in, the BRRD toolkit also includes: sale of business, bridge bank, and asset separation. See also: https://srb.europa.eu/en/content/tasks-tools

[8] More information can be found here: https://srb.europa.eu/en/content/resolution-qa

[9] In this regard, see recital No. 67 of the BRRD: http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32014L0059&from=EN

criteria and select: *i*) banks that issued fixed-rate bonds both before and after the introduction of the BRRD in order to avoid potential issues related to sample selection that can bias our main results; *ii*) banks that are deposit-taking and loan-making institutions (Beltratti and Stulz, 2012),[10] and *iii*) banks with at least one bond issuance for every given year in the sample period. All in all, these criteria lead us to a final sample of 28 banks (see Table A1 in the Appendix for a list of the sampled banks).[11] For each selected bank, we then supplement our sample of bonds by manually searching, in each bank's website, potential bond issuances – especially non-listed ones – that are missing from the Thomson Reuters Eikon database.

Data concerning the characteristics of the bonds are obtained from Thomson Reuters Eikon or hand-collected directly from the final terms of each issuance when they are not available. Following Sironi (2003), we collect data regarding the coupon offered by fixed-rate bonds, the frequency of coupon payment, the size of the issuance, the maturity, and the listing venue, if any. Consistent with previous literature (e.g., Sironi, 2003; Gabbi and Sironi, 2005; Iannotta, 2011; Iannotta et al., 2013a), we exclude perpetual bonds, while we include bonds denominated in euro, with no optional component (e.g., call or put option). Overall, this selecting procedure leads us to a unique dataset of 1,798 bonds issued by a sample of 28 Italian banks during the period January 2013 – December 2016. Table A1 in the Appendix also shows the bonds distribution, by bank.

Notably, our sample only includes senior bonds in the fixed interest category (fixed coupon or zero coupon). This choice is motivated by several reasons. First, as pointed by Santos (2014), "unique" features of bonds such as floating-rates and call option can affect bonds pricing. Second, non-structured senior bonds are the most common type of bonds in Italian households' portfolios (Coletta and Santioni, 2016) and, more importantly, this allows us to measure the yield to maturity at issuance, which ultimately represents the effective cost of funding borne by the banks. Since our goal is to study the impact that the adoption of the BRRD has generated on the cost of funding borne by the banks when issuing bonds, we refer exclusively to the returns offered in the primary market – following the

[10] As in Beltratti and Stulz (2012) we require a deposit to assets ratio above 20% and a loan to assets ratio above 10%.

[11] Because bank holding companies operate internal capital markets, shocks to one part of the organization are likely to be transmitted to other subsidiaries (Houston et al., 1997). We therefore use the BHC's information to summarize the condition of all its subsidiary lenders. We link each relationship lender's information with its ultimate BHC parent.

approach used, among others, by Morgan and Stiroh (2001), and Sironi (2003). Indeed, as pointed out by Zaghini (2014), the fluctuations of the returns observed in the secondary market do not influence the cost of funding for the issuing banks. Moreover, for many securities included in our sample, the secondary market is inexistent. Indeed, 80% of the bonds in our dataset are not publicly traded in a regulated stock exchange or MTF (multilateral trading facility). In any case, because our aim is to investigate the effect of regulation on the bond funding costs, this would be precluded when analyzing the secondary market.

It must be noticed, as well, that the yield to maturity at issuance is not available in Thomson Reuters Eikon. Therefore, we hand-collected this information from the final terms of each bond issuance. The yield to maturity at issuance is then compared to the yield offered by Italian sovereign bonds with similar maturity in order to construct our variable of interest, which is the '*Spread*'.[12]

A first summary of the data shows that the average number of issuances, per year, is slightly greater than 520 during the first three years of the investigated period, with a peak of 610 and 608 in 2013 and 2014, respectively. In 2016, conversely, the issuances fall to 212, of which 70% in the first semester of the year. This decrease is probably due to the expansionary monetary policies adopted by the ECB (Bufacchi, 2017), which reduced the necessity of funding from retail investors.

In the first months of the observed period the *Spread* takes negative values, reaching a minimum of –3,13%, as reported in Panel A of Table 1. This appears to contradict theoretical assumptions according to which sovereign bonds should be considered risk free by domestic investors, or at least as a basis rate to price non-sovereign bonds. Yet this phenomenon, well known by practitioners, is not new also to academics: even if on the basis of different samples and periods, other researchers have indeed indicated the presence of negative spreads in the Italian bank bonds market (inter alia, Grasso et al., 2010; Del Giudice, 2017). As mentioned above, the motivation could lie in the commercial skills of the bank salesforces and the bank placing power (Del Giudice, 2017). The variable *Spread* also shows a wide dispersion over the sample period; this could be due to bank and bond specific

[12] We use the *Rendistato* – as a proxy of the Italian sovereign bond yield –, which is an average return of sovereign bonds computed for a variety of maturities and published each month by the Bank of Italy. See: https://www.bancaditalia.it/compiti/operazioni-mef/rendistato-rendiob

characteristics; therefore, we explore how those variables are related to each other by employing a multivariate set-up in Section 4.

In Panel A of Table 1 we also report the descriptive statistics – for the entire period – of the variables related to the characteristics of each bond (BOND VAR) utilized in our analysis. In contrast, in Panel B we report a snapshot of the summary statistics of the same variables in two distinct sub-periods, namely *pre* bail-in (2013–2015) and *post* bail-in adoption (2016).

– TABLE 1 HERE –

The average spread for the entire period is 0.58%. However, as reported in Panel B of Table 1, the analysis of the two sub periods reveals that, prior to the switch to the bail-in regime, the average spread was 0.56%, while after January 2016 the average spread increased of about 14 basis points reaching the value of 0.70%. This is not a minor increase if we think that it represents a surge of about 25% in the interest rates spreads from the bailout era to the new bail-in regime.[13]

Concerning the other BOND VAR, we note that the average maturity for the entire sample is less than 4 years, the average amount issued is Euro 53,74 million, and less than 20% of the bonds is listed in a regulated stock exchange or MTF. We do not observe any significant change of the main bond characteristics when comparing the pre- and post- 2016 period, as the mean values of such BOND VARs in the two sub-periods are not statistically different.

To ascertain whether the introduction of the BRRD increases bank bonds cost of funding, we estimate a regression model that includes: *i*) a dummy, labelled "*Post2016*", which equals one when a bond was issued after 1st January 2016 and zero otherwise, *ii*) a dummy, labelled "*Non_Bailinable*", which equals one when a bond is either secured, senior secured, or asset backed, and zero otherwise (i.e., senior unsecured, unsecured), as well as *iii*) an interaction term between *Post2016* and *Non_Bailinable* dummies. Particularly, this interaction is essential for us to test the differential impact of the new bail-in regime on investors in bail-inable bonds and non-bail-inable securities, which are *de facto* excluded from the bail-in scope. Specifically, we estimate the following regression model

[13] Please note that the means from the two sub-samples are statistically different (unreported t-tests).

$$Spread_{i,t} = \beta_0 + \beta_1 Post2016 + \beta_2 Non\_Bailinable_{i,t} + \beta_3 Post2016 x Non\_Bailinable_{i,t} +$$

$$\beta_4 BOND\ VAR_{i,t} + \beta_5 BANK\ VAR_{t-1} + \beta_6 TIME\ FE + \beta_7 BANK\ FE + e_i \quad (1)$$

where:

BOND VAR is a vector of bond characteristics, which includes the following variables:

- *Maturity* = the time to maturity, in years, measured at the issuing date (as in Iannotta et al., 2013a);
- *Size* = the log of the amount issued (as in Iannotta and Navone, 2008);
- *Listed* = a dummy equal to one if the bond is listed in a regulated stock exchange or MTF;
- *Step-up* = a dummy equal to one if the bond has a step-up structure.

BANK VAR is a vector of lagged variables[14] related to the bank characteristics extracted from the Bureau van Dijk "Orbis–Bank Focus" database, which includes the following:

- *Bank Rating* = a variable that, following the rating scale provided by Iannotta et al. (2013b), associates numerical values to the mean of the ratings assigned (to each issuance) by S&P, Moody's, and Fitch, with higher values denoting greater risk;
- *Bank Size* = the natural logarithm of total assets;
- *TBTF (TBTF2)* = a dummy that equals one if the total assets of the issuing bank are higher than the average (75th percentile) total assets of the sample in a given year;
- *Tier 1 ratio* = ratio of Tier 1 capital to risk weighted assets;
- *ROAA* = return on average assets (computed by Orbis as net income divided by the average of total assets at the beginning and at the end of the period);
- *Liquid Assets ratio* = ratio of liquid assets and the sum of customer deposits and short-term funding (measured by Orbis);

[14] We utilize banks' balance sheets data related to the year preceding the issuance of the bond as that is the most recent public information available, to investors, at the issuing date (as in Zaghini, 2014). In other words, the data from banks' statements in year *t*–1 is utilized to generate our BANK VAR(s) that are matched to the BOND VAR(s) related to bonds issued in year *t*.

- *NPL ratio* = ratio of non-performing loans and the total amount of outstanding credits (measured by Orbis).

TIME FE are year dummies that we add to control for changing market conditions that could influence the value of the spread.

BANK FE are bank fixed effects that we include in order to control for unobservable, time-invariant, bank characteristics that might influence the bond yields. Additionally, in one of our specifications, we replace TIME FE and BANK FE with BANK*TIME fixed effect, which allows controlling for time-varying bank unobserved heterogeneity. Standard errors are clustered at the bank level.

We expect β_1 to be positive as investors should ask for a higher risk premium upon the entry into force of the BRRD. In contrast, β_2 should exhibit a negative sign provided that non-bail-inable securities, on average, would offer lower returns than bail-inable ones, due to their lower riskiness. The coefficient of the interaction term, β_3, should also be negative, as we expect holders of bail-inable securities to ask for a higher risk premium, compared to non-bail-inable debtholders, once they realize that their investments are potentially at risk due to the implementation of the new bail-in regime.

The second regression model adds the interactions between bank characteristics and the "*Post2016*" dummy, thus to investigate if significant differences in investors' reaction, due to the bank characteristics, emerge after the BRRD became effective.

Specifically, we estimate the following regression model:

$$Spread_{i,t} = \beta_0 + \beta_1 Post2016 + \beta_2 Non\_Bailinable_{i,t} + \beta_3 Post2016\text{x}Non\_Bailinable_{i,t} + \beta_4 BOND\ VAR_{i,t} + \beta_5 BANK\ VAR_{t-1} + \beta_6 Post2016\text{x}BANK\ VAR_{t-1} + \beta_7 TIME\ FE + \beta_8 BANK\ FE + e_i \quad (2)$$

As regards the bond features, we expect the size of the issuance to be negatively correlated with the *Spread*. Indeed, by issuing larger amounts of bonds, banks can benefit of a decrease in the cost of funding due to better economies of scale. In addition, greater issues are usually offered by larger banks

that can more easily target a broader share of least bargaining retail investors, given their wider distribution network (Sironi, 2003). The maturity, at least theoretically, should be positively correlated with our dependent variable, as higher yields should be offered to bonds with longer redemption horizons (Zaghini, 2014). Furthermore, we expect listed bonds to be cheaper for banks with respect to non-listed ones because the access to capital markets should guarantee a liquid investment to the investor. However, we are conscious that investors may not price the liquidity premium because of the low level of banks transparency. Similarly, step-up securities could be overall cheaper for banks, as investors might not be completely able to fairly price such kind of securities because of the appealing structure of their increasing coupons.

Moving to the bank characteristics, we expect that investors demand greater returns from bonds issued by riskier banks. For this reason, the variable "*Bank Rating*" – that takes, by construction, greater values when the creditworthiness is lower – should be positively correlated to our dependent variable, thus implying an increase in the cost of funding. In contrast, we expect *Bank Size* to reduce the spread, given that large banks should benefit from the implicit guarantee of the TBTF phenomenon, but also because they should be able to better diversify their business and have a more skilled management (Sironi, 2003; Ueda and Weder Di Mauro, 2013; Santos, 2014). *Tier 1 ratio* should have a negative effect on spreads, because more capitalized banks normally enjoy a good reputation in the market and can raise money at a lower rate of return. Nevertheless, Herring (2010) shows that those banks that required a government intervention during the financial crisis had, on average, more regulatory capital than those not requiring it. It would follow that regulatory capital is not always an efficient regulatory tool. With respect to the issuer's profitability, as measured through ROAA, we expect it to exert a negative impact on spreads, considering that a greater profitability should signal a greater efficiency (Sironi, 2003). Alternatively, a higher ROAA could also reflect a greater risk-propensity by banks; in such a case, we should find a positive correlation with the spread (Flannery and Sorescu, 1996). The effect of the liquid assets ratio can be either negative or positive. Indeed, from one hand, bank liquidity can have a positive impact on bank solvency. On the other hand, greater values of the liquid assets ratio can be perceived as a sign of inefficiency in the management of the liquidity or, alternatively, they could inspire managers to take on more risk (Myers and Rajan,

1998), and increase conflicts of interest between managers and shareholders (Jensen, 1986). Lastly, it is reasonable to expect that a greater exposure to impaired loans (as measured by the Non-Performing Loans (NPL) ratio) increases the spread at issuance because of a greater credit risk exposure and a higher uncertainty about future performances (Flannery and Sorescu, 1996).

Table 2 offers descriptive statistics of the abovementioned variables. Notably, we observe that the average amount of impaired loans over total loans is about 15%, with a maximum value of 36%. The average Tier 1 ratio is a little greater than 11% across the whole period, while the mean of the liquid assets ratio is 12.5%. Moreover, it is worth noting the poor profitability of the banks, as measured by the ROAA, during the observed period. Table A2 in the Appendix reports the correlation matrix related to the regressors employed in our analyses, which reveals that multicollinearity is unlikely to be a concern.

– TABLE 2 HERE –

4. Results

The estimates of our regression model (1) are reported in Table 3. The first test – reported in Column 1 – is carried out on a simplified version of model (1) where we do not include the interaction term between '*Post2016*' and the '*Non-bailinable*' dummies. Such an interaction is then included from Column 2 onwards. In columns 3–5 we add bank fixed effects. Additionally, from Column 4 we add a control variable for the bank riskiness. Whereas, in Columns 5 to 7 we include alternative measures of the bank size to check its effect on the spread at issuance. Finally, in Column 8 we report a test conducted by adding bank-year fixed effects.

Overall, results confirm our earlier evidence from the univariate analysis. Indeed, the dummy '*Post2016*' is positively and highly significantly (at the 1% level) correlated with the *Spread* suggesting that, after the introduction of the bail-in framework, issuing bonds became costlier for Italian banks. As expected, the '*Non-bailinable*' dummy has a negative and statistically significantly coefficient (at the 1% level) in all the specifications, thus corroborating our predictions that non-bail-inable bonds carry lower yields due to their intrinsic lower level of riskiness – as being explicitly

excluded from the scope of the bail-in tool. Starting from Column 2, we then introduce the interaction term between '*Post2016*' and the '*Non-bailinable*' dummies. Its coefficient consistently exhibits a negative and significant sign across the various model specifications and is also robust to the inclusion of bank fixed effect and bank-year fixed effects in Columns 3-5 and 8, respectively. Overall, this finding confirms our expectations that, upon the introduction of the BRRD, investors ask for a higher return compared to non-bail-inable bonds. Although we cannot completely rule out any alternative explanations, results from Table 3 seem to provide evidence of an improved market discipline.

– TABLE 3 HERE –

Among the bond characteristics, we observe that the spread is negatively correlated with *Size,* which could be explained by the economies of scale and the liquidity that the bank gains when placing larger issuances. Indeed, the greater the amount issued, the lower the return that needs to be offered to the potential bondholder. This could also be explained by the fact that only larger banks and better capitalized ones are usually involved in big issuances (Zaghini, 2014). This alternative explanation seems to be supported by the fact that the coefficient is no longer significant once we control for bank-fixed effects. Consistent with Rokkanen (2009) and Grasso et al. (2010), *Maturity* has a negative and significant coefficient. This result, apparently surprising, might be due to the significant concentration (85%) of short-medium term issuances (3-5 years) in our sample. Therefore, we repeat the analysis using different measures of *Maturity* (untabulated results), but the results do not change considerably.[15] An alternative hypothesis is that banks that are more creditworthy find it easier to issue longer-term bonds (Zaghini, 2014). Surprisingly, the dummy *Listed* enters with a positive sign, suggesting that bonds that are traded on stock exchanges are costlier than bond traded OTC (over the counter). This result appears contradictory from a theoretical perspective, because listed bonds should be more liquid for investors. However, this coefficient is no longer statistically significant once we control for bank heterogeneity in Columns 3–5 and 8. Finally, *Step-up* bonds show a lower return at

[15] In particular, we used three dummies for bonds with a maturity lower than 3 years, from 3 to 5 years, and more than 5 years.

the issuing date; it is indeed possible that investors accept a lower spread because they are influenced by the promise of an increasing coupon.

Moving to Column 4, we test the effect of BANK VAR on the spread for the entire sample period. Consistently with previous literature, we find that *Bank Rating* has a negative influence on the spread at launch: that is, the lower the issuer's rating the higher the return granted to investors and thus the cost of funding.

Further evidence about the issuer's characteristics arises from Columns 5–7, where we focus on the importance of the bank size (*Bank Size, TBTF* and *TBTF2*) for the spread at issuance. The results show that all the three variables enter with negative signs, supporting the idea that investors expect that large banks enjoy an implicit TBTF guarantee (Anginer and Warburton, 2014; Santos, 2014).

– TABLE 4 HERE –

Interesting results also emerge from our regression model (2) whose estimates are reported in Table 4. Column 1 shows the effects of bank specific factors on the spread. Consistently with our expectations, banks characterized by better ratings, larger size, and a lower level of non-performing loans, are able to issue bonds at lower spread. Higher *Tier 1 ratio* does not seem to be a selective factor for investors over the whole sample period. This evidence is line with some literature which points out that book equity measures do not capture the banks' true ability to absorb losses (see Flannery and Giacomini, 2015).

In Columns 2 to 7, we introduce the interaction terms between the bank risk specific variables and the dummy *'Post2016',* which allows us to investigate the effectiveness of the new legislation in increasing the awareness, among investors, of the greater risks they might face in case a resolution action is undertaken against the bond issuers. The results of our analysis are indeed consistent with a higher risk-sensitivity of the spread at issuance after the implementation of the BRRD. Notably, we observe that since 2016 the majority of the bank variables report statistically significant coefficients, thus confirming that the information regarding the banks' fundamentals incrementally influences investors' decisions. Specifically, banks characterized by lower ratings, and lower profitability, were

forced to increase the returns of their bonds in comparison to the *pre* 2016 period. Interestingly, the interaction of *Bank Size* with '*Post2016*' highlights that, following the entry into force of the BDDR, large banks issued bonds ensuring, on average, higher spreads (see also Zaghini, 2014; Acharya et al., 2016) as the market figures out that the hypothesis of a public implicit guarantee is no longer reliable (Flannery and Sorescu, 1996).[16] Furthermore, we find that banks with a lower *Tier 1 ratio* were forced to pay a higher spread on their bonds, suggesting that retail investors started to pay more attention to this solvency indicator – which is in line with recent findings by Accornero and Moscatelli (2018).[17]

Some researchers (e.g., Haldane, 2012) point out that the business of the largest banks is often tilted to trading, investment banking and other market related activities, so that it turns out to be less transparent, especially after the blast of the financial crisis. Therefore, the greater risk perceived by investors, which translates into a greater spread, could be due to the complexity and opacity of these banks rather than to the change in legislation. Even though the two effects (complexity and regulation) could coexist, we believe plausible to assert that the complexity effect is since long priced by the market, and that no particular increase in the level of complexity has emerged since 2016. Therefore, the post 2016 effect can be credibly attributable to the new regulatory framework. Please also note that, having considered in our regression model both variables that are proxies of the business models and fixed effects, we are implicitly controlling for the different complexity levels at each bank.

5. Additional analyses

In this Section we present further sets of robustness tests. Most tables referred to in this section are found in the Online Appendix.

5.1 Anticipation effect

Some researchers (see, for instance, Schäfer et al., 2016) highlight that a new legislation could produce an effect on the market also before its entry into force, more precisely when decisive resolutory actions are taken by preluding a credible implementation of the new rules. This is what

[16] Although not reported, the coefficients of the interactions of *Post2016* with TBTF and TBTF2 are both positive and statistically significant.
[17] After the introduction of the bail-in framework, many Italian banks increased the marketing and advertising communication about this indicator, which little by little became of common knowledge also for retail investors.

happened in Italy at the end of 2015 when a *quasi bail-in* was implemented to 4 small regionally chartered banks. This event represents a unique opportunity to test whether such cases of default could have improved investors' awareness about the negative consequences of futures bail-ins, possibly leading them to be more careful about their investment decisions. Therefore, we rerun our entire analysis utilizing a dummy equal to one for bonds issued after November 16th 2015, namely when the Italian Government published the Law 180/2015 aimed at exerting a *burden sharing* approach to resolve the aforementioned 4 small banks. Our main results – reported in Table OA1 in the Online Appendix – do not change appreciably, thus supporting the idea that the market actually started to properly price bonds even before the scheduled entry into force of the new bail-in regime.

5.2 Endogeneity issues

One potential concern that might arise from our study is that the observed increase in the spread could be due to an overall increase of banks' riskiness, rather than to an actual increased perception of bail-in occurrences. While we believe that by comparing bail-inable to non-bail-inable bonds we are mainly capturing the effect of the regulatory change, we cannot rule out this alternative explanation. Therefore, we address this issue in a variety of ways.

First of all, our main regression model adds bank fixed effects that control for bank specific, time-invariant characteristics that account for other unobserved features that might affect our results. Our *within* bank analysis mitigates the possibility that sources of distress at the bank level could drive our results. In a more refined version of our model we also include bank-year fixed effects, which allow to control for bank specific, time-variant characteristics, and our main results hold.

Second, to further reduce this concern, we exclude those banks in the sample that experienced severe problems during the observed period. Specifically, the ECB required Banca Carige to boost its total capital, which deteriorated over the years as a consequence of the unresolved problem of high NPLs. Veneto Banca, instead, was orderly liquidated, in 2017, by the National Resolution Authority (Banca d'Italia) after serious undercapitalization problems came out in 2015. Therefore, in order to alleviate the concern that the observed increase in *Spread* is led by the relatively high riskiness of these few banks in our sample, we decide to run again our estimates by excluding Banca Carige, as

well as Veneto Banca and its controlled BancApulia. Table OA2 in the Online Appendix reports the results arising from the analysis conducted on such a sub-sample. Overall, this modification broadly corroborates our conclusions.[18]

Third, following Schäfer et al. (2016) and Giuliana (2018), we show that the spread between bail-inable and non-bail-inable bonds reacts also to events that do not produce a significant increase in banks' risk such as, for instance, the events linked to the legislative process of the BRRD. More specifically, we repeat our tests by employing a dummy, labelled '*Post 2014'*, that equals one when a bond was issued after 15th April 2014 – that is the date when (according to Schäfer et al., 2016) the EU Parliament backed Commission's proposal on the Single Resolution Mechanism. Table OA3 in the Online Appendix displays the results of such a test. The results are in line with our main findings in Table 3, and are robust to a variety of subsamples. Indeed, regressions are run on the entire sample (see Column 1); on a sample that excludes the bonds issued during the bail-in era (i.e., 2016) (see Column 2) in order to avoid concerns related to the fact that there was an increase of generic risk among banks; and on a sample that only includes bond issuances made one year before and one year after 15th April 2014 (i.e., from April 2013 to April 2015) (see Column 3). Overall, our evidence corroborates the idea that the shock on the yield spread is not necessarily the consequence of a generalized increase of banks risk.

5.3 Other robustness tests

Another possible issue that might affect our main analyses is that not all the banks in our sample issued non-bail-inable bonds. Hence, one might wonder whether the observed increase in the *Spread* between bail-inable and non-bail-inable bonds is driven by the securities issued from those banks that have not issued non-bail-inable bonds across the period. To address this concern, we decide to run again our models by including only the observations related to the intermediaries that have issued at least one non-bail-inable bond over our sample period. This leads us to a sample of 991 bonds issued by 11 banks. Results from this sub-sample are reported in Table OA4 in the Online Appendix and confirm our main findings.

[18] The Italian bank Monte dei Paschi di Siena has not issued any fixed-rate bond after the entry into force of the BRRD, therefore it is not in our sample.

Moreover, because two banking groups in our sample (i.e., UBI Banca, and Crédit Agricole Cariparma) have issued a significantly high number of bonds compared to the rest of the banks in the sample (see Table A1 in the Appendix), one could argue that our results are driven by the intrinsic characteristics of the two aforementioned issuers. To rule out this possibility, we run again our regression model (1) on a sample that excludes the observations related to UBI Banca and Crédit Agricole Cariparma. Results from this sub-sample are reported in Table OA5 and confirm our main findings.

Finally, we examine how the main results are affected by the choice of the regressors by employing alternative proxies for the bank characteristics as included in the BANK VAR vector. More specifically, we use a dummy that tracks if a bank is listed (instead of the logarithm of total assets),[19] "Total Capital Ratio" (in lieu of "TIER 1"), ROAE (rather than ROAA), "Liquid assets over total deposits and borrowings" (instead of "Liquid assets over customer deposits and short term funding"), "Net charge off over average gross loans" (as opposed to the NPL ratio), as alternative proxies for the bank size, capitalization, profitability, liquidity, and credit quality, respectively. Furthermore, we add the "Cost-to-income ratio" as a measure of the bank's efficiency. Table OA6 in the Online Appendix reports the results from this robustness check, which widely confirms our findings.

6. Conclusions

The Global Financial Crisis started in 2007 represented a big challenge for regulators around the world. Large amount of taxpayers' money was utilized to resolve troubled banks in order to limit the negative spillovers that eventual bank defaults would have generated to interconnected financial systems. In light of this, European policy makers decided to agree, as proposed by the FSB, on a "revolutionary" change about how to resolve stressed banks. That is why in May 2014 the European Legislative Bodies adopted the BRRD, which led to a deep change from a bailout regime to an "internal" way of rescuing banks – so-called bail-in. In essence, this radical switch in regulation aimed at transferring the bank risk from taxpayers to the banks' shareholders and unsecured bondholders.

[19] Because the Bank FE absorb the 'Listed bank' variable – since this is constant over our sample period –, we first run our model without Bank FE (Column 1); whereas from Column 2 onwards we use 'Bank Size' – measured as Log of Total Assets – in order to control for unobserved bank heterogeneity.

Because of this increased risk, holders of bail-inable liabilities are expected to ask, ceteris paribus, for higher returns compared to holders of liabilities that are excluded from the bail-in mechanism.

Therefore, in this paper we assess the effect of the new rules on the cost paid by Italian banks when issuing bonds, by comparing bonds that are subject to the new regulatory framework compared to bonds that are specifically excluded. To test this, we rely on a unique dataset of 1,798 fixed-rate senior bonds offered by a sample of 28 Italian banks during the years 2013–2016. The Italian market is a good laboratory for testing our hypothesis for several reasons. Italian banks are quite dependent on bonds as a form of funding, compared to banks in other European countries; also, the portion of bank bonds in Italian retail investors' portfolios is rather greater than the average of developed countries. Second, Italian banks mainly place their bonds directly (i.e., OTC) to their unsophisticated customers, giving rise to obvious conflicts of interest, which makes even more important the analysis of the effectiveness of the new regulation. Third, the National Resolution Authority (i.e., the Bank of Italy) applied a *quasi bail-in* to 4 small banks in November 2015, a few weeks before the official implementation of the new bail-in framework. Notably, although those 4 regionally chartered banks accounted for less than 2% of the Italian banking market, the news of their *quasi bail-in* became the hot topic in the news for a while, which could have enhanced investors' awareness about the negative consequences of bail-ins on their savings and investments.

Overall, we find that Italian banks experience, on average, a higher bond funding cost upon the introduction of the new regulatory framework. Indeed, while controlling for bond and bank characteristics, as well as bank fixed effects and bank-time fixed effects, our findings reveal that – since the entry into force of the BRRD – the average cost borne by the issuing banks increases compared to the cost borne by the Government when issuing bonds with similar maturities.

Consistent with the existing literature, we observe that banks characterized by lower ratings, profitability, capitalization, and higher liquidity were forced to pay higher spreads to place their bonds with the new bail-in regime. Additional analyses also highlight that such an effect significantly emerged right after the decision of the Italian Resolution Authority to resolve 4 small banks in November 2015 by exerting a so-called burden sharing to some of those banks bondholders. This confirms the existence of a bail-in effect on the cost of funding borne by the banks through the

issuance of bonds. Moreover, we confirm the robustness of our findings by conducting several tests in Section 5.

Overall, our main results offer interesting policy implications because, as prescribed by the new legislation, Authorities should also count on market discipline to improve their prudential supervision. Higher risk sensitivity, indeed, is especially needed in countries like Italy where, historically, market discipline has not been working properly.

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Table 1: Descriptive statistics of the bond characteristics (BOND VAR vector)
This table presents summary statistics of the bonds characteristics. 'Spread' is the difference between the bond yield at issuance and the yield offered by sovereign bonds with corresponding maturity. 'Maturity' is the time to maturity, in years, measured at the issuing date. 'Amount issued' represents the total fund raised via the bond issuance. 'Listed' is a dummy equal to one if the bond is listed in a regulated stock exchange or MTF, and zero otherwise.

Panel A – Entire period (2013-2016)

	N	Mean	Median	Standard Deviation	Min	Max
Spread (%)	1,798	0.579	0.498	0.739	-3.126	8.151
Maturity	1,798	3.887	3.000	2.104	1.500	25.500
Amount issued (*millions of Euro*)	1,798	53.738	10.000	156.961	0.008	1,500.000
Listed	1,798	0.188	0.000	0.391	0.000	1.000

Panel B – Pre and post 2016

	N	Mean	Median	Standard Deviation	Min	Max
Spread (%)						
Pre	1,586	0.563	0.487	0.734	-3.126	8.151
Post 2016	212	0.701	0.626	0.772	-1.259	5.118
Maturity						
Pre	1,586	3.840	3.000	1.982	1.500	20.000
Post 2016	212	4.236	3.000	2.838	2.000	25.500
Amount issued (*millions of Euro*)						
Pre	1,586	52.634	10.431	153.613	0.008	1,500.000
Post 2016	212	62.001	9.567	180.236	0.010	1,250.000
Listed						
Pre	1,586	0.186	0.000	0.389	0.000	1.000
Post 2016	212	0.208	0.000	0.407	0.000	1.000

Table 2: Descriptive statistics of the bank characteristics (BANK VAR vector)
This table presents summary statistics of the banks characteristics. 'Bank rating' is a variable that associates numerical values to the mean of the ratings assigned (to each issuance) by S&P, Moody's, and Fitch, with higher values denoting greater risk. 'Bank size' is the natural logarithm of total assets. 'Tier1 ratio' is the ratio of Tier 1 capital over risk-weighted assets. 'ROAA' is the return on average assets. 'Liquid assets ratio' is the ratio of liquid assets over the sum of customer deposits and short-term funding. 'NPL ratio' is the ratio of non-performing loans over the total amount of outstanding credit.

	N	Mean	Median	Standard deviation	Min	Max
Bank rating	112	12.716	12.000	3.739	7.000	18.000
Bank size	112	16.894	17.354	1.838	13.570	20.556
Tier 1 ratio (%)	112	11.462	11.200	3.276	6.560	24.303
ROAA (%)	112	-0.107	0.131	0.734	-2.742	0.865
Liquid assets ratio (%)	112	12.521	9.520	9.020	1.654	40.342
NPL ratio (%)	112	14.972	14.092	6.673	2.127	35.879

Table 3: Bail-in regime and the spread at the issuing date

This table reports regression results related to model (1). The estimation period is January 2013–December 2016. The dependent variable is the spread between the bond yield at issuance and the yield offered by sovereign bonds with corresponding maturity. 'Post 2016' is a dummy that equals one when a bond was issued after 1st January 2016, and zero otherwise. 'Non-bailinable' is a dummy that equals one when a bond is excluded from the scope of the bail-in tool, and zero otherwise. 'Size' is the logarithm of the amount issued. 'Maturity' is the time to maturity, in years, measured at the issuing date. 'Listed' is a dummy equal to one if the bond is listed in a regulated stock exchange or MTF, and zero otherwise. 'Step-up' is a dummy equal to one if the bond has a step-up structure, and zero otherwise. 'Bank rating' is a variable that associates numerical values to the mean of the ratings assigned (to each issuance) by S&P, Moody's, and Fitch, with higher values denoting greater risk. 'Bank size' is the natural logarithm of total assets. 'TBTF' ('TBTF2') is a dummy equal to one if the total assets of the issuing bank are higher than the average (75th percentile) total assets of the sample in a given year. Columns 1–7 include year fixed effects. Columns 3–5 include bank fixed effects. Column 8 includes bank*year fixed effects. Heteroskedasticity-robust standard errors, clustered at the bank level, appear in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post 2016	0.479***	0.484***	0.544***	0.538***	0.534***	0.489***	0.498***	
	(0.06)	(0.06)	(0.05)	(0.05)	(0.05)	(0.05)	(0.06)	
Non-bailinable	-0.662***	-0.632***	-0.612***	-0.613***	-0.618***	-0.615***	-0.613***	-0.548***
	(0.11)	(0.12)	(0.12)	(0.12)	(0.13)	(0.12)	(0.12)	(0.12)
Post 2016xNon-bailinable		-0.240**	-0.223**	-0.218**	-0.219**	-0.208**	-0.205*	-0.116**
		(0.10)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.06)
Size	-0.024***	-0.024***	-0.000	-0.001	-0.001	-0.003	-0.011	-0.008
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Maturity	-0.102***	-0.102***	-0.081***	-0.081***	-0.080***	-0.104***	-0.104***	-0.082***
	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.017)
Listed	0.071*	0.070*	0.084	0.082	0.086	0.101**	0.096**	0.066
	(0.04)	(0.04)	(0.06)	(0.06)	(0.06)	(0.04)	(0.04)	(0.06)
Step-up	-0.378***	-0.378***	-0.316***	-0.319***	-0.318***	-0.357***	-0.352***	-0.313***
	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)	(0.037)
Bank rating				0.032***	0.032***	0.032***	0.034***	
				(0.01)	(0.01)	(0.00)	(0.01)	
Bank size					-0.340**			
					(0.15)			
TBTF						-0.122***		
						(0.034)		
TBTF2							-0.064*	
							(0.04)	
Constant	0.949***	0.948***	0.630***	0.385	6.244	0.432***	0.473***	1.042***
	(0.09)	(0.09)	(0.09)	(0.24)	(4.30)	(0.10)	(0.11)	(0.10)
Observations	1,798	1,798	1,798	1,798	1,798	1,798	1,798	1,798
No. Of Banks	28	28	28	28	28	28	28	28
Adjusted R-squared	0.26	0.26	0.44	0.44	0.44	0.29	0.29	0.52
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Bank FE	No	No	Yes	Yes	Yes	No	No	No
Bank-Year FE	No	No	No	No	No	No	No	Yes

Table 4: Bail-in regime and the spread at the issuing date – Interactions with bank characteristics
This table reports regression results related to model (2). The estimation period is January 2013–December 2016. The dependent variable is the spread between the bond yield at issuance and the yield offered by sovereign bonds with corresponding maturity. 'Post 2016' is a dummy that equals one when a bond was issued after 1st January 2016, and zero otherwise. 'Non-bailinable' is a dummy that equals one when a bond is excluded from the scope of the bail-in tool, and zero otherwise. 'Size' is the logarithm of the amount issued. 'Maturity' is the time to maturity, in years, measured at the issuing date. 'Listed' is a dummy equal to one if the bond is listed in a regulated stock exchange or MTF, and zero otherwise. 'Step-up' is a dummy equal to one if the bond has a step-up structure, and zero otherwise. 'Bank rating' is a variable that associates numerical values to the mean of the ratings assigned (to each issuance) by S&P, Moody's, and Fitch, with higher values denoting greater risk. 'Bank size' is the natural logarithm of total assets. 'Tier1 ratio' is the ratio of Tier 1 capital over risk-weighted assets. 'ROAA' is the return on average assets. 'Liquid assets ratio' is the ratio of liquid assets over the sum of customer deposits and short-term funding. 'NPL ratio' is the ratio of non-performing loans over the total amount of outstanding credit. All regressions include year and bank fixed effects. Heteroskedasticity-robust standard errors, clustered at the bank level, appear in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Post 2016	0.372***	0.545***	0.407**	0.310*	0.740***	0.733***	0.670***
	(0.11)	(0.18)	(0.19)	(0.18)	(0.18)	(0.19)	(0.18)
Non-bailinable	-0.575***	-0.590***	-0.590***	-0.586***	-0.612***	-0.600***	-0.599***
	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)
Post 2016xNon-bailinable	-0.145*	-0.159*	-0.157*	-0.156*	-0.149*	-0.163*	-0.161*
	(0.08)	(0.08)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
Size	-0.003	-0.002	-0.002	-0.002	-0.003	-0.002	-0.003
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Maturity	-0.082***	-0.080***	-0.080***	-0.080***	-0.079***	-0.080***	-0.080***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Listed	0.074	0.073	0.072	0.071	0.077	0.085	0.084
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
Step-up	-0.308***	-0.312***	-0.311***	-0.312***	-0.318***	-0.316***	-0.317***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Bank rating	0.059**	0.037*	0.036*	0.043*	0.042*	0.039*	0.040*
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Bank size	-0.078*	-0.170**	-0.180**	-0.155**	-0.152**	-0.159**	-0.141*
	(0.04)	(0.08)	(0.06)	(0.07)	(0.07)	(0.07)	(0.08)
Tier1 ratio	-0.020	-0.039	-0.039	-0.039	-0.014	-0.016	-0.016
	(0.02)	(0.04)	(0.04)	(0.04)	(0.02)	(0.02)	(0.02)
ROAA	0.004	0.010	0.011	0.007	0.014	0.010	0.004
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Liquid asset ratio	0.001	-0.002	-0.002	-0.003	0.002	-0.003	-0.004
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
NPL ratio	0.066***	0.062***	0.062***	0.062***	0.055***	0.057***	0.055***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Bank rating x Post 2016		0.059***	0.056***	0.070**	0.057**	0.049**	0.046**
		(0.01)	(0.02)	(0.03)	(0.02)	(0.02)	(0.03)
Bank size x Post 2016			0.067*	0.060**	0.064*	0.058*	0.056*
			(0.04)	(0.03)	(0.04)	(0.03)	(0.03)
Tier1 ratio x Post 2016				-0.034**	-0.029*	-0.030*	-0.028*
				(0.02)	(0.02)	(0.02)	(0.02)
ROAA x Post 2016					-0.796***	-0.763***	-0.754***
					(0.20)	(0.19)	(0.19)
Liquid asset ratio x Post 2016						0.014*	0.014*
						(0.01)	(0.01)
NPL ratio x Post 2016							0.006
							(0.01)
Constant	1.637	3.862	4.113	3.692	-0.208	-0.764	-1.612
	(4.22)	(4.30)	(4.54)	(4.59)	(4.72)	(4.67)	(4.78)
Observations	1,798	1,798	1,798	1,798	1,798	1,798	1,798
No. of Banks	28	28	28	28	28	28	28
Adjusted R-squared	0.46	0.46	0.46	0.47	0.47	0.47	0.47
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Appendix

Table A1: List of the sampled banks and related characteristics as of December 2016
This table reports the names of the sampled banks (first column), along with the corresponding number of bonds issued (second column). The third column provides each bank's total assets in thousands of Euro as of December 2016 (last observed year in our sample). Main owner's name and related share held are reported in the fourth and fifth columns, respectively. Column six shows if a bank is listed in a stock exchange, while column seven provides information about the banks' type. The eighth column provides the total number of a bank's branches, whereas the ninth column reports whether a bank has branches abroad. Finally, the Authority in charge of each bank's supervision – either European Central Bank (ECB) or Bank of Italy – is reported in the last column.

Bank Name	No. of bonds issued, by bank	Total Assets th EUR	Main owner	Main owner (% of shares held)	Listed	Bank type	Number of branches	Presence abroad	Supervisory Authority
UniCredit SpA	17	859,532,774	Capital Research and Management Company	6.73%	Yes	Commercial	4,778	Yes	ECB
Intesa Sanpaolo	57	725,100,000	Compagnia San Paolo	9.34%	Yes	Commercial	5,843	Yes	ECB
Banco Popolare	62	117,411,003	None		Yes	Commercial	2,320		ECB
Unione di Banche Italiane Scpa-UBI Banca	320	112,383,917	Fondazione Cassa di Risparmio di Cuneo	5.91%	Yes	Commercial	1,843		ECB
Mediobanca SpA	6	69,818,605	Unicredit SpA	8.46%	Yes	Commercial	222	Yes	ECB
BPER Banca S.P.A.	126	64,960,024	UnipolSai Assicurazioni spa	5.01%	Yes	Commercial	1,219		ECB
Credit Agricole Cariparma SpA	269	52,992,004	Credit Agricole	76.50%		Commercial	612		ECB
Banca Popolare di Milano SCaRL	48	51,131,039	None		Yes	Commercial	2,320		ECB
Banca Popolare di Sondrio Società Cooperativa per Azioni	73	37,196,325	None		Yes	Commercial – Cooperative	363	Yes	ECB
Veneto Banca scpa	77	28,078,254	None			Commercial	480	Yes	ECB
Banca Carige SpA	17	26,111,004	Malacalza Investmenti Srl	17.58%	Yes	Commercial	529		ECB
Banca Piccolo Credito Valtellinese	92	25,469,459	None		Yes	Commercial	412		Bank of Italy
Cassa di risparmio di Asti SpA	58	12,845,257	Fondazione CR Asti	37.82%		Commercial	245		Bank of Italy
Unipol Banca Spa	84	12,434,175	Unipol Group	42.25%	Yes	Commercial	263		Bank of Italy
Banco di Desio e della Brianza SpA-Banco Desio	105	12,365,903	Brianza Unione	52.92%	Yes	Commercial	265		Bank of Italy
Banca Popolare dell'Alto Adige Spa-Suedtiroler Volksbank	53	9,316,086	None			Commercial	176		Bank of Italy
Cassa di Risparmio di Ravenna SpA	11	6,890,625	Fondazione Cassa di Risparmio di Ravenna	49.40%		Commercial	86		Bank of Italy
Banca Agricola Popolare di Ragusa SCARL	42	4,580,833	None			Commercial – Cooperative	93		Bank of Italy
Banca Valsabbina Societa cooperativa per azioni	35	4,405,435	None			Commercial – Cooperative	70		Bank of Italy
Banca Popolare di Cividale Societa Cooperativa per azioni	4	4,271,405	None			Commercial – Cooperative	67		Bank of Italy
BancApulia SpA	44	4,237,424	Veneto Banca	70.41%		Commercial	85		ECB
Banca Popolare di Puglia e Basilicata	8	4,126,123	None			Commercial – Cooperative	117		Bank of Italy
Banca di Credito Cooperativo di Carate Brianza	20	2,662,857	None			Commercial – Cooperative	30		Bank of Italy
Banca di credito popolare SCRL	40	2,442,549	None			Commercial – Cooperative	67		Bank of Italy
Banca Popolare del Lazio	23	2,272,856	None			Commercial – Cooperative	59		Bank of Italy
Banca Popolare Sant'Angelo	79	1,041,636	None			Commercial – Cooperative	29		Bank of Italy
Banca S. Biagio del Veneto Orientale di Cesarolo e Fossalta di Portogruaro - Banca di Credito Cooperativo	18	935,173	None			Commercial – Cooperative	17		Bank of Italy
Banco di Credito P. Azzoaglio SpA	10	927,657	Azzoaglio family	N.A.		Commercial	19		Bank of Italy
Total	1,798								

Notes:

- The banks are listed in the table according to their size – from the largest to the smallest.
- When the fourth column reports “None”, it means that the bank does not have a majority shareholder – which is mostly the case of cooperative banks.
- When the fifth column reports “N.A.”, it means that the share (in %) owned by the main owner is not available.
- BancApulia appears to be subject to the supervision of the ECB as its main owner was Veneto Banca.
- Banca Popolare dell’Alto Adige Spa-Suedtiroler Volksbank became a joint-stock company in 2016; however, no majority shareholder is found as the bank is a publicly held company with more than 60 thousand shareholders and, anyway, shareholders’ rights are limited when the share is greater than 5%.

Table A2: Correlation matrix

This table shows the correlations matrix related to the regressors employed in our analyses. 'Non-bailinable' is a dummy that equals one when a bond is excluded from the scope of the bail-in tool, and zero otherwise. 'Size' is the logarithm of the amount issued. 'Maturity' is the time to maturity, in years, measured at the issuing date. 'Listed' is a dummy equal to one if the bond is listed in a regulated stock exchange or MTF, and zero otherwise. 'Step-up' is a dummy equal to one if the bond has a step-up structure, and zero otherwise. 'Bank rating' is a variable that associates numerical values to the mean of the ratings assigned (to each issuance) by S&P, Moody's, and Fitch, with higher values denoting greater risk. 'Bank size' is the natural logarithm of total assets. 'Tier1 ratio' is the ratio of Tier 1 capital over risk-weighted assets. 'ROAA' is the return on average assets. 'Liquid assets ratio' is the ratio of liquid assets over the sum of customer deposits and short-term funding. 'NPL ratio' is the ratio of non-performing loans over the total amount of outstanding credit.

	Non-bailinable	Size	Maturity	Listed	Step-up	Bank rating	Bank size	Tier1 ratio	ROAA	Liquid asset ratio	NPL ratio
Non-bailinable	1										
Size	0.343	1									
Maturity	0.312	0.029	1								
Listed	0.300	0.242	0.222	1							
Step-up	-0.086	0.091	0.034	0.080	1						
Bank rating	-0.084	-0.217	-0.026	-0.163	-0.097	1					
Bank size	0.164	0.427	0.033	0.141	0.047	-0.698	1				
Tier1 ratio	0.014	-0.083	0.007	-0.093	0.010	0.221	-0.217	1			
ROAA	0.019	-0.102	0.133	-0.075	0.072	-0.017	-0.119	0.262	1		
Liquid asset ratio	0.166	0.209	0.121	0.141	-0.034	-0.197	0.319	0.082	-0.020	1	
NPL ratio	-0.030	-0.149	0.009	0.018	-0.137	0.378	-0.236	0.105	-0.291	-0.162	1

Online Appendix

Table OA1: Bail-in regime and the spread at the issuing date – Anticipation effect (burden sharing applied to four banks – November 2015)

This table reports regression results related to model (1). The estimation period is January 2013–December 2016. The dependent variable is the spread between the bond yield at issuance and the yield offered by sovereign bonds with corresponding maturity. 'Post 2015' is a dummy that equals one when a bond was issued after **16th November 2015**, and zero otherwise. 'Non-bailinable' is a dummy that equals one when a bond is excluded from the scope of the bail-in tool, and zero otherwise. 'Size' is the logarithm of the amount issued. 'Maturity' is the time to maturity, in years, measured at the issuing date. 'Listed' is a dummy equal to one if the bond is listed in a regulated stock exchange or MTF, and zero otherwise. 'Step-up' is a dummy equal to one if the bond has a step-up structure, and zero otherwise. 'Bank rating' is a variable that associates numerical values to the mean of the ratings assigned (to each issuance) by S&P, Moody's, and Fitch, with higher values denoting greater risk. 'Bank size' is the natural logarithm of total assets. 'TBTF' ('TBTF2') is a dummy equal to one if the total assets of the issuing bank are higher than the average (75th percentile) total assets of the sample in a given year. All regressions include year fixed effects. Columns 2–4 include bank fixed effects. Heteroskedasticity-robust standard errors, clustered at the bank level, appear in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level.

	(1)	(2)	(3)	(4)	(5)	(6)
Post 2015	0.152*	0.135**	0.140**	0.138**	0.181**	0.167**
	(0.08)	(0.06)	(0.07)	(0.06)	(0.08)	(0.08)
Non-bailinable	-0.662***	-0.633***	-0.634***	-0.637***	-0.645***	-0.646***
	(0.11)	(0.13)	(0.13)	(0.13)	(0.12)	(0.12)
Post 2015xNon-bailinable		-0.108**	-0.090*	-0.110*	-0.124*	-0.091*
		(0.05)	(0.05)	(0.06)	(0.07)	(0.05)
Size	-0.024***	-0.000	-0.001	-0.001	-0.003	-0.012
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Maturity	-0.103***	-0.082***	-0.081***	-0.081***	-0.104***	-0.104***
	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
Listed	0.070*	0.083	0.080	0.084	0.101**	0.096**
	(0.04)	(0.06)	(0.06)	(0.06)	(0.04)	(0.04)
Step-up	-0.377***	-0.313***	-0.317***	-0.316***	-0.356***	-0.350***
	(0.03)	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)
Bank rating			0.037***	0.022**	0.033***	0.034***
			(0.00)	(0.01)	(0.00)	(0.01)
Bank size				-0.332*		
				(0.200)		
TBTF					-0.123***	
					(0.03)	
TBTF2						-0.041**
						(0.02)
Constant	0.950***	0.630***	0.355	6.076	0.434***	0.474***
	(0.09)	(0.10)	(0.24)	(4.29)	(0.10)	(0.11)
Observations	1,798	1,798	1,798	1,798	1,798	1,798
No. of Banks	28	28	28	28	28	28
Adjusted R-squared	0.26	0.44	0.44	0.44	0.29	0.29
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	No	Yes	Yes	Yes	No	No

Table OA2: Bail-in regime and the spread at the issuing date – Subsample excluding Banca Carige, Veneto Banca, and BancApulia

This table reports regression results related to model (1). The estimation period is January 2013–December 2016. The dependent variable is the spread between the bond yield at issuance and the yield offered by sovereign bonds with corresponding maturity. 'Post 2016' is a dummy that equals one when a bond was issued after 1st January 2016, and zero otherwise. 'Non-bailinable' is a dummy that equals one when a bond is excluded from the scope of the bail-in tool, and zero otherwise. 'Size' is the logarithm of the amount issued. 'Maturity' is the time to maturity, in years, measured at the issuing date. 'Listed' is a dummy equal to one if the bond is listed in a regulated stock exchange or MTF, and zero otherwise. 'Step-up' is a dummy equal to one if the bond has a step-up structure, and zero otherwise. 'Bank rating' is a variable that associates numerical values to the mean of the ratings assigned (to each issuance) by S&P, Moody's, and Fitch, with higher values denoting greater risk. 'Bank size' is the natural logarithm of total assets. 'TBTF' ('TBTF2') is a dummy equal to one if the total assets of the issuing bank are higher than the average (75th percentile) total assets of the sample in a given year. All regressions include year fixed effects. Columns 3–5 include bank fixed effects. Heteroskedasticity-robust standard errors, clustered at the bank level, appear in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Post 2016	0.469***	0.474***	0.476***	0.473***	0.473***	0.479***	0.502***
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Non-bailinable	-0.610***	-0.581***	-0.593***	-0.594***	-0.593***	-0.577***	-0.516***
	(0.10)	(0.11)	(0.12)	(0.12)	(0.12)	(0.11)	(0.11)
Post 2016xNon-bailinable		-0.131**	-0.148**	-0.145**	-0.145**	-0.135*	-0.147**
		(0.06)	(0.07)	(0.06)	(0.07)	(0.07)	(0.07)
Size	-0.037***	-0.037***	-0.011	-0.011	-0.011	-0.027***	-0.021***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Maturity	-0.089***	-0.089***	-0.077***	-0.077***	-0.077***	-0.091***	-0.091***
	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
Listed	0.064*	0.064	0.038	0.037	0.036	0.084**	0.035
	(0.04)	(0.04)	(0.06)	(0.06)	(0.06)	(0.04)	(0.04)
Step-up	-0.300***	-0.300***	-0.249***	-0.251***	-0.251***	-0.284***	-0.267***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Bank rating				0.013***	0.013***	0.025***	0.013***
				(0.00)	(0.00)	(0.00)	(0.00)
Bank size					-0.139***		
					(0.03)		
TBTF						-0.120***	
						(0.03)	
TBTF2							-0.165***
							(0.04)
Constant	0.968***	0.967***	0.679***	0.538**	-0.136	0.603***	0.759***
	(0.09)	(0.09)	(0.09)	(0.22)	(4.31)	(0.10)	(0.10)
Observations	1,660	1,660	1,660	1,660	1,660	1,660	1,660
No. of Banks	25	25	25	25	25	25	25
Adjusted R-squared	0.27	0.27	0.39	0.39	0.39	0.29	0.30
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	No	No	Yes	Yes	Yes	No	No

Table OA3: Bail-in regime and the spread at the issuing date – Anticipation effect (EU approval of the proposal to establish uniform rules for the resolution of banks, April 2014)

This table reports regression results related to model (1). The estimation period is January 2013–December 2016 in Column 1; January 2013–December 2015 in Column 2; April 2013–April 2015 in Column 3. The dependent variable is the spread between the bond yield at issuance and the yield offered by sovereign bonds with corresponding maturity. 'Post 2014' is a dummy that equals one when a bond was issued after **15th April 2014**, and zero otherwise. 'Non-bailinable' is a dummy that equals one when a bond is excluded from the scope of the bail-in tool, and zero otherwise. 'Size' is the logarithm of the amount issued. 'Maturity' is the time to maturity, in years, measured at the issuing date. 'Listed' is a dummy equal to one if the bond is listed in a regulated stock exchange or MTF, and zero otherwise. 'Step-up' is a dummy equal to one if the bond has a step-up structure, and zero otherwise. All regressions include year and bank fixed effects. Heteroskedasticity-robust standard errors, clustered at the bank level, appear in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level.

	FULL SAMPLE	**2013-2015**	**4/2013-4/2015**
	(1)	(2)	(3)
Post 2014	0.181***	0.180***	0.170***
	(0.04)	(0.04)	(0.04)
Non-bailinable	-0.432***	-0.453***	-0.493***
	(0.16)	(0.17)	(0.18)
Post 2014xNon-bailinable	-0.406***	-0.401**	-0.378**
	(0.14)	(0.16)	(0.18)
Size	0.004	0.003	-0.007
	(0.01)	(0.01)	(0.01)
Maturity	-0.081***	-0.076***	-0.069***
	(0.02)	(0.02)	(0.02)
Listed	0.085	0.070	0.092
	(0.06)	(0.06)	(0.06)
Step-up	-0.326***	-0.361***	-0.371***
	(0.04)	(0.04)	(0.04)
Constant	0.581***	0.593***	0.676***
	(0.10)	(0.11)	(0.13)
Observations	1,798	1,586	1,207
No. of banks	28	28	28
Adjusted R-squared	0.45	0.43	0.46
Year FE	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes

Table OA4: Bail-in regime and the spread at the issuing date – Subsample excluding the banks that did not issue covered bonds

This table reports regression results related to model (1). The estimation period is January 2013–December 2016. The dependent variable is the spread between the bond yield at issuance and the yield offered by sovereign bonds with corresponding maturity. 'Post 2016' is a dummy that equals one when a bond was issued after 1st January 2016, and zero otherwise. 'Non-bailinable' is a dummy that equals one when a bond is excluded from the scope of the bail-in tool, and zero otherwise. 'Size' is the logarithm of the amount issued. 'Maturity' is the time to maturity, in years, measured at the issuing date. 'Listed' is a dummy equal to one if the bond is listed in a regulated stock exchange or MTF, and zero otherwise. 'Step-up' is a dummy equal to one if the bond has a step-up structure, and zero otherwise. 'Bank rating' is a variable that associates numerical values to the mean of the ratings assigned (to each issuance) by S&P, Moody's, and Fitch, with higher values denoting greater risk. 'Bank size' is the natural logarithm of total assets. 'TBTF' ('TBTF2') is a dummy equal to one if the total assets of the issuing bank are higher than the average (75th percentile) total assets of the sample in a given year. All regressions include year fixed effects. Columns 3–5 include bank fixed effects. Heteroskedasticity-robust standard errors, clustered at the bank level, appear in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Post 2016	0.185***	0.183***	0.184***	0.185***	0.193***	0.215***	0.193***
	(0.06)	(0.06)	(0.07)	(0.07)	(0.07)	(0.06)	(0.06)
Non-bailinable	-0.468***	-0.473***	-0.504***	-0.504***	-0.501***	-0.454***	-0.520***
	(0.12)	(0.13)	(0.15)	(0.15)	(0.15)	(0.13)	(0.14)
Post 2016xNon-bailinable		-0.108*	-0.096*	-0.10*	-0.077*	-0.078*	-0.103*
		(0.06)	(0.06)	(0.05)	(0.04)	(0.04)	(0.05)
Size	-0.028***	-0.028***	-0.038***	-0.038***	-0.038***	-0.036***	-0.029***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Maturity	-0.087***	-0.087***	-0.080***	-0.080***	-0.080***	-0.085***	-0.083***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Listed	0.035	0.035	0.123	0.123	0.121	0.015	0.055
	(0.06)	(0.06)	(0.08)	(0.08)	(0.08)	(0.06)	(0.06)
Step-up	-0.274***	-0.274***	-0.264***	-0.265***	-0.264***	-0.263***	-0.287***
	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.03)	(0.04)
Bank rating				0.037***	0.050***	0.037***	0.030***
				(0.01)	(0.01)	(0.01)	(0.01)
Bank size					-0.091***		
					(0.03)		
TBTF						-0.131***	
						(0.05)	
TBTF2							-0.276***
							(0.09)
Constant	0.888***	0.889***	0.937***	0.855***	-2.832	0.698***	0.514***
	(0.12)	(0.12)	(0.13)	(0.21)	(10.06)	(0.13)	(0.15)
Observations	991	991	991	991	991	991	991
No. of Banks	11	11	11	11	11	11	11
Adjusted R-squared	0.25	0.25	0.26	0.26	0.26	0.26	0.26
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	No	No	Yes	Yes	Yes	No	No

Table OA5: Bail-in regime and the spread at the issuing date – Subsample excluding the two major issuers
This table reports regression results related to model (1). The estimation period is January 2013–December 2016. The dependent variable is the spread between the bond yield at issuance and the yield offered by sovereign bonds with corresponding maturity. 'Post 2016' is a dummy that equals one when a bond was issued after 1st January 2016, and zero otherwise. 'Non-bailinable' is a dummy that equals one when a bond is excluded from the scope of the bail-in tool, and zero otherwise. 'Size' is the logarithm of the amount issued. 'Maturity' is the time to maturity, in years, measured at the issuing date. 'Listed' is a dummy equal to one if the bond is listed in a regulated stock exchange or MTF, and zero otherwise. 'Step-up' is a dummy equal to one if the bond has a step-up structure, and zero otherwise. 'Bank rating' is a variable that associates numerical values to the mean of the ratings assigned (to each issuance) by S&P, Moody's, and Fitch, with higher values denoting greater risk. 'Bank size' is the natural logarithm of total assets. 'TBTF' ('TBTF2') is a dummy equal to one if the total assets of the issuing bank are higher than the average (75th percentile) total assets of the sample in a given year. Columns 1–7 include year fixed effects. Columns 3–5 include bank fixed effects. Column 8 includes bank*year fixed effects. Heteroskedasticity-robust standard errors, clustered at the bank level, appear in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post 2016	0.859***	0.875***	0.848***	0.969***	0.992***	0.816***	0.845***	
	(0.08)	(0.08)	(0.07)	(0.07)	(0.07)	(0.08)	(0.08)	
Non-bailinable	-0.631***	-0.565***	-0.582***	-0.576***	-0.583***	-0.511***	-0.579***	-0.499***
	(0.13)	(0.14)	(0.14)	(0.14)	(0.15)	(0.14)	(0.14)	(0.14)
Post 2016xNon-bailinable		-0.477***	-0.511***	-0.589***	-0.581***	-0.541***	-0.460***	-0.404***
		(0.15)	(0.16)	(0.16)	(0.17)	(0.16)	(0.15)	(0.15)
Size	0.009	0.009	0.044***	0.048***	0.049***	0.031***	0.011	0.036***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Maturity	-0.125***	-0.125***	-0.094***	-0.096***	-0.096***	-0.123***	-0.124***	-0.097***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Listed	-0.104**	-0.105**	0.013	0.019	0.025	-0.047	-0.058	0.031
	(0.04)	(0.04)	(0.06)	(0.06)	(0.06)	(0.05)	(0.05)	(0.06)
Step-up	-0.266***	-0.265***	-0.267***	-0.245***	-0.236***	-0.263***	-0.275***	-0.237***
	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)	(0.05)
Bank rating				0.140***	0.155***	0.016**	0.016**	
				(0.04)	(0.04)	(0.01)	(0.01)	
Bank size					-0.839***			
					(0.27)			
TBTF						-0.282***		
						(0.04)		
TBTF2							0.150***	
							(0.04)	
Constant	0.752***	0.748***	0.305**	1.995***	16.105***	0.512***	0.526***	0.767***
	(0.11)	(0.11)	(0.12)	(0.44)	(4.52)	(0.13)	(0.13)	(0.11)
Observations	1,209	1,209	1,209	1,209	1,209	1,209	1,209	1,209
No. of Banks	26	26	26	26	26	26	26	26
Adjusted R-squared	0.34	0.34	0.54	0.54	0.55	0.36	0.35	0.61
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Bank FE	No	No	Yes	Yes	Yes	No	No	No
Bank*Year FE	No	No	No	No	No	No	No	Yes

Table OA6: Bail-in regime and the spread at the issuing date – Interactions with alternative proxies of the bank characteristics

This table reports regression results related to model (2). The estimation period is January 2013–December 2016. The dependent variable is the spread between the bond yield at issuance and the yield offered by sovereign bonds with corresponding maturity. 'Post 2016' is a dummy that equals one when a bond was issued after 1st January 2016, and zero otherwise. 'Non-bailinable' is a dummy that equals one when a bond is excluded from the scope of the bail-in tool, and zero otherwise. 'Size' is the logarithm of the amount issued. 'Maturity' is the time to maturity, in years, measured at the issuing date. 'Listed' is a dummy equal to one if the bond is listed in a regulated stock exchange or MTF, and zero otherwise. 'Step-up' is a dummy equal to one if the bond has a step-up structure, and zero otherwise. 'Bank rating' is a variable that associates numerical values to the mean of the ratings assigned (to each issuance) by S&P, Moody's, and Fitch, with higher values denoting greater risk. 'Listed bank' is a dummy equal to one if the bank is listed in a regulated stock exchange. 'Bank size' is the natural logarithm of total assets. 'Total capital ratio' is the ratio of Tier 1 + Tier 2 capital over risk-weighted assets. 'ROAE' is the return on average equity. 'Liquid assets to tot. D&B' is the ratio of liquid assets over the sum of depositors' and borrowers' funds. 'NCO to average gross loans' is the ratio of net charges off over gross loans. 'Cost to income' is the ratio of the costs of running the bank over the bank's income. Regressions in columns 2–7 include bank fixed effects. All regressions include year fixed effects. Heteroskedasticity-robust standard errors, clustered at the bank level, appear in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Post 2016	0.467***	0.957*	1.375**	1.897**	1.635**	1.732**	1.737**
	(0.08)	(0.54)	(0.70)	(0.90)	(0.82)	(0.83)	(0.82)
Non-bailinable	-0.610***	-0.620***	-0.613***	-0.637***	-0.627***	-0.622***	-0.631***
	(0.12)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)
Post 2016xNon-bailinable	-0.223**	-0.182*	-0.178*	-0.169*	-0.168*	-0.166*	-0.167*
	(0.11)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
Size	-0.005	-0.001	-0.001	-0.002	-0.002	-0.001	-0.001
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Maturity	-0.095***	-0.079***	-0.080***	-0.078***	-0.079***	-0.079***	-0.080***
	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Listed	0.104**	0.074	0.072	0.083	0.087	0.081	0.081
	(0.05)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
Step-up	-0.342***	-0.315***	-0.316***	-0.321***	-0.319***	-0.317***	-0.312***
	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Bank rating	0.017***	0.017*	0.025**	0.017*	0.016*	0.019**	0.016*
	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Listed bank	-0.247***						
	(0.04)						
Listed bank x Post2016	0.149*						
	(0.08)						
Bank size		-0.503*	-0.480*	-0.217*	-0.206*	-0.210*	-0.318
		(0.26)	(0.25)	(0.12)	(0.11)	(0.12)	(0.26)
Total capital ratio	-0.017	-0.020	-0.018	-0.003	-0.005	-0.006	-0.017
	(0.05)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
ROAE	-0.016***	-0.002	-0.002	-0.001	-0.001	-0.001	0.002
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Liquid assets to tot. D&B	0.003	0.014	0.014	0.009	0.005	0.004	0.015
	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
NCO to average gross loans	0.074***	0.071**	0.094*	0.052*	0.050*	0.056*	0.079*
	(0.02)	(0.03)	(0.06)	(0.03)	(0.03)	(0.03)	(0.04)
Bank rating x Post 2016		0.048**	0.075**	0.027*	0.030*	0.027*	0.027*
		(0.02)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)
Bank size x Post 2016		0.074*	0.074*	0.082*	0.072*	0.074*	0.065*
		(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Total capital ratio x Post 2016			-0.059*	-0.032**	-0.028*	-0.026*	-0.025*
			(0.03)	(0.01)	(0.01)	(0.01)	(0.01)
ROAE x Post 2016				-0.062***	-0.059***	-0.061***	-0.075***
				(0.01)	(0.01)	(0.01)	(0.01)
Liquid assets to tot. D&B x Post 2016					0.024**	0.022**	0.018*
					(0.01)	(0.01)	(0.01)
NCO to average gross loans x Post 2016						0.125*	0.124*
						(0.07)	(0.07)
Cost to income							0.004
							(0.00)
Cost to income x Post 2016							-0.020***
							(0.01)
Constant	0.828***	9.488**	9.207**	4.472	4.333	3.611	5.626
	(0.12)	(4.53)	(4.38)	(4.50)	(4.47)	(4.56)	(4.54)
Observations	1,798	1,798	1,798	1,798	1,798	1,798	1,798
No. of Banks	28	28	28	28	28	28	28
Adjusted R-squared	0.35	0.45	0.46	0.46	0.46	0.47	0.47
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	No	Yes	Yes	Yes	Yes	Yes	Yes